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Description

Low-voltage power breaker

The invention relates to a low-voltage power breaker having a first contact arrangement for the purpose of connecting a stationary contact to a first busbar and having a second contact arrangement for the purpose of connecting an opposing contact, which is arranged on a contact lever, to a second busbar.

Low-voltage power breakers of the type mentioned have contact arrangements in order to make it possible to rapidly connect or isolate the breaker to or from current-carrying rails. This is desirable, inter alia, for the purpose of removing or carrying out maintenance on the low-voltage power breakers. Low-voltage power breakers are provided with different sizes for different rated currents. The aim here is to keep the physical dimensions of a low-voltage power breaker as low as possible.

Low-voltage power breakers of the type mentioned may be in the form of permanently installed breakers on the one hand or withdrawable breakers on the other hand. In the case of withdrawable breakers, the power breaker is moved and locked in a withdrawable part rack which is provided for this purpose. This makes it possible to connect or isolate the power breaker to or from the busbars more quickly and more easily than in the case of permanently installed breakers. It is therefore desirable to be able to convert permanently installed breakers to withdrawable breakers with as little complexity in terms of materials and work as possible.

It is therefore the object of the present invention to specify a low-voltage power breaker of the type mentioned which can be converted from a permanently installed breaker to a withdrawable breaker with a minimum amount of complexity in

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terms of materials and work.

This object is achieved according to the invention by the features in the characterizing clause of claim 1 in interaction with the features in the precharacterizing clause of claim 1.

One particular advantage of the present invention is the fact that the already provided busbars of a permanently installed breaker can be reused in a very simple manner in the conversion to a withdrawable breaker. For this purpose, the busbars of a low-voltage power breaker have design features which mean that the low-voltage power breaker can be in the form of both a permanently installed breaker and a withdrawable breaker.

In a preferred embodiment, the busbars have at least one contact region by means of which the busbars can be arranged permanently on a withdrawable part rack of a low-voltage power breaker. Furthermore, the busbars have at least one accommodating region for retaining means by means of which the busbars can be arranged permanently on a withdrawable part rack of a low-voltage power breaker.

In a preferred embodiment, the accommodating region for retaining means and the contact region are designed such that the busbars can be arranged permanently, but reversibly, on a withdrawable part rack of a low-voltage power breaker.

The abovementioned embodiment of the busbars makes it possible for them to be arranged directly on the permanently installed breaker for use in a permanently installed breaker, but it is also possible for these busbars to be arranged permanently on the withdrawable part rack of a withdrawable breaker when the permanently installed breaker is converted to a withdrawable breaker once said busbars have been removed from the permanently installed breaker, with the result that the conversion of a permanently installed breaker to a withdrawable breaker entails

a minimum amount of complexity in terms of materials since only one additional withdrawable part rack is required for this conversion. Owing to the contact region provided, the busbars can be arranged directly on the withdrawable part rack. In this case, the surfaces of the contact region should end evenly with the surface of the withdrawable part rack with which contact is to be made. As a result of the fact that the busbars have an accommodating region for retaining means, it is possible for them to be permanently provided with a retaining means and, as a result, to be permanently locked on the withdrawable part rack of a power breaker.

In a particularly preferred embodiment, both the first and the second busbar have identical dimensions. This advantageously makes it possible for the same contact arrangements, which are preferably in the form of isolating contact arrangements, to be used both for the first busbar and for the second busbar.

In accordance with a further preferred embodiment, the busbars can be arranged on the withdrawable part rack such that the withdrawable part rack has the same installation depth as the busbars in a permanently installed breaker. This ensures that the busbars need be arranged permanently on the withdrawable breaker merely using retaining means in the regions of said busbars which are provided for this purpose in order to convert the permanently installed breaker to a withdrawable breaker. As a result of the fact that the busbars arranged on a withdrawable part rack have the same installation depth as the busbars in the case of a permanently installed breaker, no further adaptation or conversion work is required.

In a particularly preferred embodiment, the busbars are in the form of plates or blades.

The invention will be explained in more detail below with reference to exemplary embodiments which are at least partially illustrated in the figures, in which:

figure 1 shows a low-voltage power breaker according to the invention which is in the form of a permanently installed breaker having closed contacts;

figure 2 shows a low-voltage power breaker according to the invention which is in the form of a permanently installed breaker having open contacts;

figure 3 shows a low-voltage power breaker according to the invention having a corresponding withdrawable part rack, and

figure 4 shows a low-voltage power breaker according to the invention which is in the form of a withdrawable breaker.

As can be seen in figure 1, a low-voltage power breaker 10 has a first contact arrangement 24 which produces a connection between a first stationary contact 18, which is arranged on a connection rail 17, and a first busbar 22. Furthermore, the power breaker 10 has a second contact arrangement 34 for the purpose of connecting a second busbar 30 to an opposing contact 16 which is arranged on a contact lever 14. The low-voltage power breaker 10 is in the form of a permanently installed breaker in figure 1 by the two busbars 22 and 30, which serve the purpose of producing a connection to system-side busbars which are not further illustrated, being fixed to the outside of the rear wall of the power breaker 10. First retaining means 12, which pass through first accommodating regions 20 of the busbars, are used for this fixing. The connection to the system-side busbars takes place using second retaining means

(not illustrated) which pass through second accommodating regions 13 of the busbars 22 and 30.

In order to reduce the variety of breaker parts required and thus to save on production costs, the connection rail 17 and the busbars 22 and 30 are of identical design, the accommodating region 13 of the connection rail 17 serving the purpose of accommodating a fourth retaining means 15. The fourth retaining means 15 serves the purpose of fixing an arcing horn 19 on the connection rail 17.

The first busbar 22 and the second busbar 30, which according to the invention have the accommodating region 20 for retaining means and a contact region 38 for the purpose of arranging the busbars 22, 30 on a withdrawable part rack 11 of the power breaker 10, make contact with the power breaker 10 with their side which faces the power breaker 10. The accommodating region 20 is in the form of a through-hole. The contact region 38 is located on that side of the busbars 22, 30 which is remote from the power breaker 10.

The contact region 38 makes it possible to remove the busbars 22, 30 according to the invention of a permanently installed breaker, as illustrated in figure 1 and figure 2, from the permanently installed breaker and to arrange them on a withdrawable part rack 11 of a power breaker 10, as is illustrated in figure 3. Furthermore, the busbars 22, 30 which are arranged in this manner on the withdrawable part rack 11 can be permanently locked by means of third retaining means 35. The retaining means bring about a permanent, force-fitting connection between the busbars 22, 30 and the withdrawable part rack 11 (as is illustrated in figure 4) by means of the accommodating regions 20 for retaining means.

As has been described above, conversion of the power breaker according to the invention from a permanently installed power

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breaker to a withdrawable power breaker can be realized in a particularly advantageous manner. The busbars 22, 30, which are locked

and arranged on the withdrawable part rack, of the power breaker which is in the form of a withdrawable power breaker advantageously have the same installation depth as the busbars of a power breaker which is in the form of a permanently installed breaker, in its operating position. For this purpose, the busbars 22 and 30 are arranged on the inside of the withdrawable part rack which is associated with the withdrawable power breaker such that they make contact with the power breaker with their side which faces the power breaker when the withdrawable power breaker is pushed in, as is also the case with the power breaker in figures 1 and 2 which is designed for permanent installation.

The position of the busbars 22 and 30 with respect to the contact arrangements 24 and 34 and with respect to the system-side busbars (not illustrated) is therefore the same in the case of the power breaker in figures 1 and 2, which is in the form of a permanently installed power breaker, as in the case of the power breaker in figures 3 and 4, which is in the form of a withdrawable power breaker.